



Explosives Basics

Prepared and presented by
Al-Saqri Foundation for Military Sciences



In the name of Allah, the Most Gracious, the Most Merciful

With the help and grace of Allah Almighty, your brothers in the Al-Saqri Foundation for Military Sciences have provided you with basic educational materials to prepare for the process of making explosives. We had needlessly lost brothers, may Allah have mercy on them, who were working hard to strike the strongholds of the infidels and apostates, but they were prevented from achieving their goals as a result of not following the basic principles of dealing with chemical and explosive materials.

Our muwahhid brother, before you work on making explosives, you should understand the basics of explosives and general safety principles in dealing with explosive materials and the equipment used. Before making a bomb, it is very necessary to understand the science of explosives in general, as this is what guarantees your success, Allah willing.

There are many types of explosives and several risks that you should be familiar with to avoid some catastrophic mistakes in dealing with explosive materials, which may lead to the injury or death of the brother who makes the bomb. To help ensure success in preparing explosives, we offer you these lessons to understand the nature of explosives and their resulting explosions.

Of the various types of explosives we offer our brothers, we must take certain considerations into hand when evaluating which is best. This course provides you with the basics. However, the best type of explo-



sive to use is determined by factors such as target type, location, and desired impact. Once you understand the basics laid out in our 10-lesson course, we will then privately discuss these considerations to determine which explosive type best fits your operation and goal.

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Explosives Basics

-Lesson 1- The Science of Explosive

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Lesson 1

Making a bomb requires making two essential parts. The first is the explosive charge. It is this charge that will kill the target. The second is the trigger. By use of the trigger, the explosive can be set off at a time and place of the brother's choosing. This lesson will discuss only the main charge, the most important and dangerous part of the bomb.

Scientists call chemicals that can explode «energetic materials.» Such materials are capable of releasing large amounts of energy very rapidly. In the blink of an eye, they vanish and create huge amounts of hot gas at high pressure. These gases shatter what they touch and send it flying outwards with deadly force.

The energy unleashed by explosives reaches us in three forms: Heat, light, and sound, which all emerge from the explosion. For example, when fireworks explode in the sky, light and sound are seen and heard. The sound is created by the hot gases pushing out from the explosion and hitting the air. The chemical reaction of the explosive going off creates much heat. This heat is not as obvious from a distance as light and sound.

As for heat, it is what creates the high-pressure gases that shatter all they touch. This heat and the gases are the source of the explosives' power. All explosives produce heat, light, and sound.

There are many types of explosives which exist. Explosives are used in the mines to free ore, by the military in warheads, and as mentioned earlier in fireworks to entertain.



These explosives are broken into three main groups depending on how they are designed to be used, as follows:

The first group is Pyrotechnics. Pyrotechnics are explosives used to create effects such as smoke, sound, light, or heat. Smoke and heat pyrotechnics have very specific uses. Smoke is used to obscure vision and allow hidden movement. Heat is produced to create molten metal which can start fire or melt steel. Pyrotechnics that produce sound and light are more traditional explosives.

The second group is Propellants. Propellants are used to produce gas in a fashion that can be used to push objects. Rockets use propellants to launch them into space. The most common propellants are those used in bullets. These materials are designed to produce just the right amount of gas to push a bullet out of the barrel of a gun.

Although propellants do explode, they do so with just enough energy to do useful work, but not so much that they destroy the objects that they are used in. A gun should not explode like a grenade, even though both use explosives to do work. Propellants can be viewed as explosives that are used to release energy in a way that is not so violent as to be destructive.

The third group are materials referred to in a general way as «Explosives.» Energetic materials that are true «Explosives» produce a very quick and violent release of energy. It is hard to capture their energy for anything but destruction. Mines use such materials to crack rock to

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Lesson 1

clear the way to reach minerals of value, and in war, these materials are used to shatter metal and propel it outwards with lethal force. In addition, demolition experts use these materials to topple buildings and bring down bridges.





Explosives Basics

-Lesson 2- Classification of Explosives

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Lesson 2

As explained in lesson one, energetic materials may be classified into categories depending on their use: Pyrotechnics, Propellants, or Explosives. However, there are other categories for classification that are based on science and need to be understood.

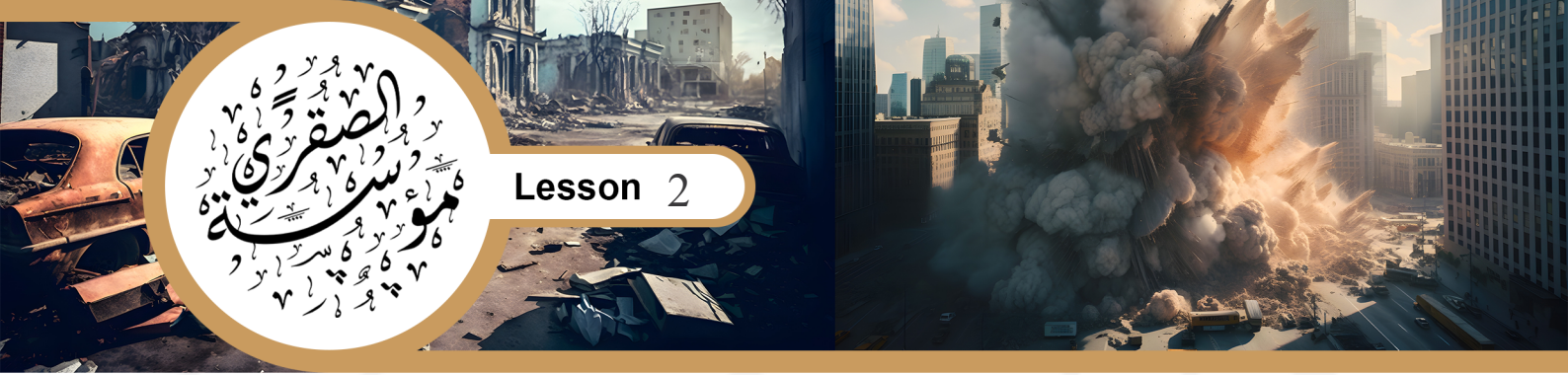
To classify an explosive based on science, there are two questions that are asked: “How fast does the explosive react?” and “What needs to be done to make the explosive react?”

One explosive may simply slowly burn with the touch of a match. Another may violently explode with the touch of a feather. Scientists and engineers have come up with categories that describe where every explosive fits based on their reactions.

The speed at which an explosion occurs is used to break down explosives into two families: “Low Explosives” and “High Explosives.”

The speeds of reactions have also been given specific names: “Deflagrations” and “Detonations.” There are complicated definitions for both deflagration and detonation, but these need not be understood to build a bomb.

It is good enough to know that deflagrations are reactions that are slower than the speed that sound travels, while detonation reactions run faster than the speed of sound travels. A detonation creates a high-pressure reaction called a shock wave.



Lesson 2

Based on how fast an explosive reaction runs it is either a “Low” or “High” explosive. Low explosives have slower deflagration reactions, and high explosives have detonations. The pyrotechnics and propellants discussed earlier are all low explosives.

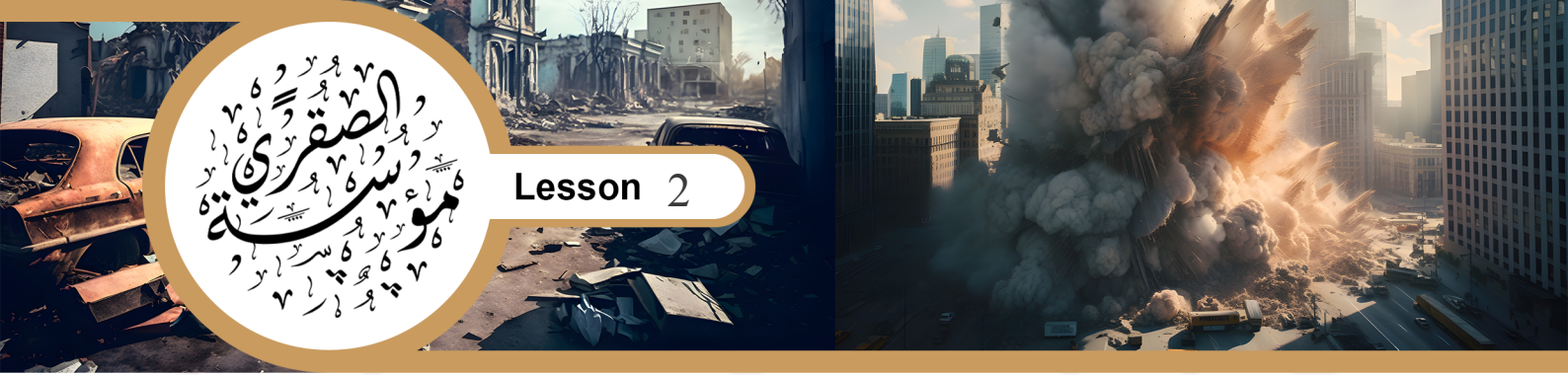
To clarify, what were referred to as “explosives” in the first lesson are really “high explosives.” Grenades, for example, use high explosives while guns and fireworks use low explosives.

There are many ways in which energy can touch an explosive. Those handling explosives need to understand those energy forms and how explosives are classified based on their response to energy put into them. Explosives can react to heat, impact, friction, spark, and shock. Some of these energies can be given to the explosive by the actions of handling and may create either deflagration or detonation. Each energy needs to be understood to avoid accidents.

The forms of energy that handling can create are: heat, impact, friction, and spark.

Heat is easy to understand. Fire and burning objects have heat contained in them. In contact with explosives, burning materials can add enough energy to start their reactions.

Impact does not have to be the strike of a hammer. Impact can be caused by dropping a container of explosives or a bomb while carrying it to a location.



Friction creates heat from the action of rubbing two items together. Friction is created during the process of grinding powders and also scraping products from containers.

Finally, spark is created by the discharge of static electricity.

As to the shock energy, it cannot be given to the explosive during the process of simple handling. Shock is a very specific type of energy created by the detonation of an explosive itself. Shock can be thought of as the energy of impact multiplied many times, and only an explosive itself can provide shock energy.

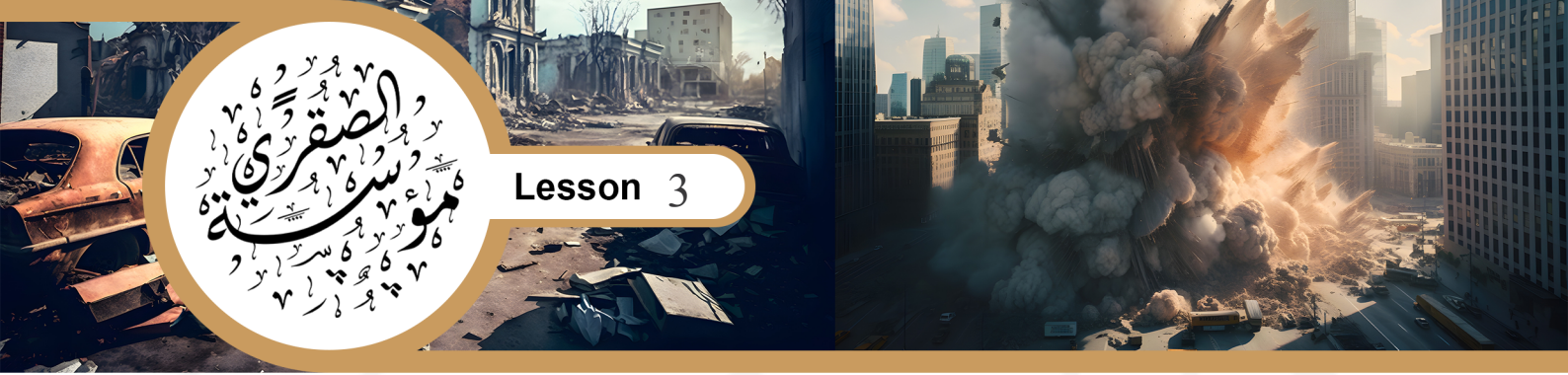




Explosives Basics

-Lesson 3- High Explosives

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High explosives are divided into three groups based on how sensitive they are to inputs of energy. These groups are Primary, Secondary, and Tertiary explosives.

Primary explosives are the most sensitive of all high explosives. These explosives can be set off with the energies of routine handling. Some primary explosives are so sensitive that a feather dropping on them will give enough energy to start a reaction. These materials are extremely dangerous. Other primary explosives are less sensitive but still dangerous. Any work with primary explosives needs great caution to avoid accidental detonation.

Secondary explosives are materials which are much less sensitive than primary explosives. Typically, these materials require the energy that can only be supplied by an actual explosive itself. These materials require what is known as a detonator or blasting cap to set them off. Some secondary explosives can even be set on fire and will simply burn and not explode.

Tertiary explosives are very insensitive and are often referred to as “blasting agents,” which are used by commercial rock blasters and miners. They need a considerable amount of explosives set off next to them to detonate. The shock energy of a detonator is not enough energy to initiate a tertiary explosive. Tertiary explosives are typically initiated with a mass of explosives much greater than that contained in a blasting cap referred to as a “booster.”

To recap the first three lessons of this course: All explosives are called energetic materials. If they react slower than the speed of sound, they deflagrate and are called low explosives. Pyrotechnics and propellants are in this family. If they produce a reaction faster than the speed of sound in their material, they detonate and are called high explosives.



High explosives are then broken down into groups depending on how sensitive they are to energy input. The most sensitive are primary explosives which can be set off with common energy of handling. Secondary explosives require a detonator or blasting cap to put shock energy into them. Tertiary explosives require a much larger mass of explosives to drive large shock energy into them before they detonate.



Lesson 3

All of the explosives discussed can be used as the main charge. How to best use them is more complicated and requires deeper understanding. Exactly which families some high explosives fit into can change depending on the way they are used. This makes producing a simple break down complicated. However, TATP, HMTD, Mercury Fulminate and Lead Azide will always behave like primary explosives and can pose great risk to the bomb builder. For those with no experience, all explosives should be treated like primaries until it can be proven they are not.



Explosives Basics

-Lesson 4- Chemical Hazards and Protective Measures

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Making explosives involves significant risks in several areas, including the hazard of dangerous chemical precursor compounds, but especially the finished explosive products. Our instructions will reduce the danger, Allah willing, but it can never be entirely eliminated.



Making explosives from common chemicals is extremely dangerous. Homemade explosives are far more unpredictable, and may be more sensitive than commercial or military explosives. We will begin by introducing you, our muwahhid brother, to the dangers you may encounter while making explosives. Later, we will provide guidance on how to reduce that danger, Allah willing.

It is essential to understand the seriousness of the materials you will be working with and their hazards. You must build protection, organization, and safety in your operation. Ask for our help and guidance if you are unsure of any procedures, dangers, or protective measures.

Chemical exposure effects:

The effects of a toxic chemical on your body may cause either temporary or permanent damage. Some chemicals cause both acute and chronic effects. For example, breathing solvent vapors might make you dizzy right away (an acute effect), but breathing the same vapors repeatedly will eventually cause liver damage, cancers (a chronic effect), or death.

Chemical exposure symptoms:

Chemical exposure may cause a number of symptoms, possibly including the following:

- Head: Dizziness, headache.
- Eyes: Red, watery, irritated, grainy feeling, blindness/ loss of eye.
- Nose and Throat: Sneezing, coughing, sore throat, constricted airway, hemorrhaging, death.
- Chest and Lungs: Wheezing, coughing, shortness of breath, lung cancer, death.
- Stomach: Nausea, vomiting, stomachache, diarrhea, death.





Lesson 4

- Skin: Redness, dryness, rash, itching, skin cancer, death.
- Nervous System: Nervousness, irritability, sleeplessness, tremors, loss of balance or coordination, permanent nerve damage, death.

Dose:

For some chemicals, the higher the amount, the greater the damage. For example, acetone is an industrial solvent that is also found in nail polish remover. It is more dangerous to the worker who uses large amounts than to the person who uses a little nail polish remover.

Duration:

It is how long you are exposed to the chemical. The longer the exposure, the greater the danger. For example, someone may work with a chemical for half an hour per day, while another person is exposed for eight hours a day. Someone may be exposed for one month, while another person may have 20 years of exposure.

Reaction and interaction with other chemicals:

Some chemicals in combination can create a different chemical that is more hazardous than the original ones (reaction). For example, ammonia and bleach used together can produce a highly toxic chemical. Some chemicals, in combination, can increase the likelihood of harm.

Route of entry:

A chemical can enter the body in one of four main routes: contact, ingestion, inhalation, and injection.

The best way to protect yourself from getting chemicals in the eyes while making explosives is to always wear eye protection. The following is also recommended:

- You should always wear a facemask or respirator while handling chemicals to avoid inhalation injuries.
- These chemicals should never be handled in an area where you live and eat, to avoid ingestion. Try to work on your explosives in a safe area away from your home, if possible.
- You should wear gloves while handling chemicals to avoid dangerous contact. **All gloves are eventually permeated by chemicals.** However, gloves can be used safely for limited time periods, if specific use and other characteristics (i.e., thickness, permeation rate, and time) are known.





Explosives Basics

-Lesson 5- Lab Organization and Operation Basics

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Lesson 5

Laboratory overview: One of the first and most important ways you can protect yourself from the dangers of working with chemicals is to have a well-planned and organized work space to handle the required chemicals. You must set up an area that is separate from your living space where you can exclude children and others who are not involved in the work. **From the very beginning, you must incorporate safety into every aspect of the lab's operation.**

In theory, you could do your chemistry experiments anywhere in your home, but if you live with others, you should let them know that the area contains hazardous materials that must not be moved. There are other considerations, too, like spill containment, ventilation, access to power and water, and fire safety.

If you are absolutely unable to have a standalone lab, home locations are a possibility, but each carries a number of severe disadvantages. Such options may include a garage, shed, outdoor area, or bathroom.

Choose an area that is well-ventilated. Many chemicals and chemical reactions release hazardous volatile fumes. Proper ventilation is essential. In addition, you want to work in a dry space. Basements can be a poor option as they are generally damp and do not have adequate ventilation. If a basement is your only option, work outside during parts of the process that produce fumes. An open window and portable exhaust fan can serve to increase ventilation.

Ensure your lab has adequate lighting for the obvious reason that you'll need to see what you are doing. If your space does not have enough light, buy some floor lamps to increase the lighting. A well-lit space will help avoid injury. Rooms with windows provide natural light and increase ventilation.

Essential items for you work area include:

- A good scale to weigh chemicals
- Glass containers
- Stirrers
- A container for an ice bath
- Ice
- Refrigerator
- Filter paper or cloth
- Funnels
- Fire extinguisher
- Gallon size carrying buckets for chemical bottles



You should use and become familiar with all of this equipment prior to beginning the actual work.



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Lesson 5

Secondary items: Once you have completed the basic lab set up described above, and gained familiarity with the equipment, work on procuring the following additional equipment and tools:

- Glue gun
- Test tube holder
- Scissors
- Alcohol or gas stove
- Micro torch
- Tweezers
- Distilling apparatus
- Stands for glass containers

Never substitute any chemicals without consulting us. Always perform the chemistry work precisely as directed by us.



Operation basics: Once you start a process with chemicals, you must:

- Remain in the lab and finish all steps until completion.
- Take care when handling hot glassware, as hot glassware looks just like cold glassware.
- Never point the open end of a container with chemicals inside at yourself or others.
- Make sure no flammable materials are in the area when lighting a flame.
- Do not leave any burners unattended.
- Keep the work area neat and free of any unnecessary objects.
- Cover your feet and do not wear sandals.
- Secure long hair and loose clothing.
- Remove silver rings if you wear them.
- Do not touch your face, eyes, or mouth while working.
- Do not touch chemicals with your hands.
- Do not touch, taste, or smell the chemicals.
- Do not place the container directly under your nose and inhale the vapors.
- Do not handle bottles that are wet or too heavy for you.





Explosives Basics

-Lesson 6- Organization of Chemicals

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All chemical containers should be sealed at all times in order to avoid accidental spills. Particularly for liquid chemicals, glass storage containers must be sealed tightly with a lid. If left unsealed, some chemicals can react with other nearby chemicals through the air. Most solid or powdered chemicals can be stored in a plastic tub with a tightly sealed lid.

Chemicals that are stored poorly will react with each other and create unpredictable results and significant dangers in the lab that could harm you, our muwahhid brother. Do not throw waste from the reactions between chemicals.

You must have a plan for waste, and dispose of waste as it is produced.





Lesson 6

Chemical separation: Separating chemicals by type is essential. Store flammables in a separate area. Do not place heavy materials or liquid chemicals on high shelves. Never store chemicals on the floor.

- Nitric acid should be stored alone.
- Acetone is separated from nitric and sulfuric acid.
- Ammonium nitrate is separate from acids, chlorates, flammable liquids, nitrates, powdered metals, combustible materials.
- Mercury is separated from acetylene, ammonia, and fulminic acid.
- Nitric acid is separated from acetic acid, acetone, alcohol, chromic acid, flammable gases, flammable liquids, hydrogen sulfide.
- Oxygen is separated from flammable liquids, solids, or gases, grease, hydrogen, and oils.
- Potassium permanganate is separated from benzaldehyde, ethylene glycol, glycerol, and sulfuric acid.



Explosives Basics

-Lesson 7- Heating and Cooling Reactions

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Cooling baths: For several reactions, it is important to achieve and maintain the correct temperature over a long period of time. Chemists use cooling baths to maintain a certain cool temperature or temperature range. Reactions are cooled down to a desired temperature by placing the reaction flask inside an appropriate cooling bath. The reagents in the reaction should never come in direct contact with the chemicals in the cooling bath, and temperature must be continuously monitored. On occasion, a solution may need to be cooled to minimize evaporation of volatile liquids, induce crystallization, or to favor a certain reaction mechanism.



Several cold baths are used for certain applications, with the simplest being an ice bath. When preparing an ice bath, it is important to use a mixture of ice and water, as an ice-water mixture has better surface contact with a flask than ice alone.

Adding salt such as sodium chloride to an ice bath will lower the temperature even more. Although the exact temperature can be hard to control, the weight ratio of salt to ice influences the temperature:

- -10° Celsius can be achieved with a 1:2.5 mass ratio of calcium chloride hexahydrate to ice.
- -20° Celsius can be achieved with a 1:3 mass ratio of sodium chloride to ice.

Ice baths can be made in plastic containers, glass beakers, or almost any container. Baths that are colder than -10° Celsius should be in an insulating container or else they cannot be easily handled and will lose heat too quickly.

Heating: Reactions at elevated temperatures may greatly increase the risk of fire, explosion, over-pressurization, and chemical exposure. Take into account the reactivity between materials and determine if there is a potential for a runaway reaction, production of gas, or explosion.

Our muwahhid brother, if you need assistance assessing the properties of your materials or reactivity hazards, ask your brothers in the Al-Saqri Foundation for assistance. There are certain chemicals that generally should not be heated, for example pyrophoric compounds, strong oxidizers, and peroxides. Never heat any





Lesson 7

mixture or solution that evolves vapors in a closed system unless you have taken into account the pressure that will be produced as a result. Do not scale up any reaction without permission.

Heating options include any stove that does not have an open flame. You should never use an open flame to heat a reaction. When heating a reaction, it is a good practice to use a stir mechanism to prevent uneven heating. When selecting a stir method, take into account the thickness of the mixture and the importance of even mixing for the reaction.

Heating safety essentials:

- Remove all unneeded flammable and combustible materials from the area prior to heating a reaction.
- Allow the reaction to cool completely to room temperature before handling.
- Use a timer to control the length of time heat is applied, or use an audible timer as a reminder to check your reaction and/or adjust the heat when necessary.
- Do not leave heated reactions unattended, or at an absolute minimum, you must allow the reaction to reach target temperature and equilibrate before you can leave the area.



Explosives Basics

-Lesson 8- Acids and Bases Basics

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An acid contributes hydrogen cations (protons) to a solution, whereas a base donates an electron pair (this is a simplified definition). When diluting an acid, pour the acid into water (or base).

Composition of reaction vessels:

We routinely receive questions from the brothers about reaction vessels, as in whether one should use metal or plastic containers instead of glass. The answer is now, as both quickly corrode or disintegrate when exposed to most chemicals. Pouring certain chemicals into a metal container can result in extremely violent and dangerous reactions.

It is best to use glass containers, and do not substitute glass without consulting the experts. Glass is a very important material for carrying out experiments, and only certain types



of glass should be used for heating, and for harsh chemicals. Beware, our muwahhid brother, that **recycled beverage or food bottles will eventually fail** and present a risk to your safety and your success.

Handling corrosive chemicals: Corrosive chemicals require extra caution even beyond that taken for other chemicals. Immediately close all containers of corrosive chemicals after use.

Transferring corrosive chemicals: Due to the risk of splashes and equipment failures, do not use a syringe and needle to perform transfers of corrosive chemicals in volumes of greater than 5 mL. When performing small-volume liquid transfers of highly corrosive materials, it is not appropriate to use a separate needle and syringe, because the needle can detach from the syringe barrel. Integrated needle syringes should be used for small-volume liquid chemical transfers.

It is vital to perform liquid transfers slowly using a funnel to minimize splash, splatter, and spills.

Do not **pour** water into acid. **Slowly add** acid to water while carefully stirring. Some corrosive chemicals will generate heat and/or release gas on contact with water. You must understand the potential for reaction with water before diluting any chemical. The water may need to be cooled with a cooling system, as described earlier, with continuous stirring while acid is added.





Explosives Basics

-Lesson 9-

**Corrosive Chemical Reactions,
Flammable and Combustible Liquids**

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Lesson 9

Corrosive chemical reactions: Reactions involving corrosive chemicals can generate significant amounts of heat. The container used must be large enough to allow for extra volume in the vessel in order to account for expansion and possible foaming. It may be necessary to pre-cool solutions and cool while mixing or reacting.

Corrosive chemicals are substances that cause visible destruction or permanent changes in human skin tissue at the site of contact, or are highly corrosive to steel. Injurious chemicals cause tissue destruction at the site of contact.

Corrosive chemical examples:

- Strong Bases: hydroxides of sodium, potassium, ammonia.
- Strong Acids: hydrochloric, sulfuric, phosphoric, nitric.
- Strong Dehydrating Corrosives: sulfuric, phosphorous pentoxide, calcium oxide.
- Strong Oxidizing Corrosives: concentrated hydrogen peroxide, sodium hypochlorite.
- Corrosive Solids: phosphorous, phenol.
- Corrosive Gases: chlorine, ammonia.



Lesson 9

Flammable and combustible liquids: Flammable and combustible liquids form a vapor/air mixture that is capable of burning in the presence of an ignition source.

- Flammable liquids will ignite more easily than combustible liquids. The flashpoint of a flammable liquid is the lowest temperature at which it can form an ignitable mixture with air and produce a flame when a source of ignition is present.
- Combustible liquids have a flashpoint at or above 37.8° C (100° F) and below 93.3° C (200° F). Flammable liquids are chemicals that have a flash point below 100°F (38.7° C) and a vapor pressure that does not exceed 40 psig at 100° F.





Explosives Basics

-Lesson 10- Chemistry of Explosives

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Lesson 10

An explosive is any chemical compound or mechanical mixture that, when subjected to heat, impact, friction, detonation, or other suitable initiation, undergoes rapid chemical change, evolving large volumes of highly heated gases, typically nitrogen or CO₂, that exert pressure on the surrounding medium.

It is possible to intentionally or unintentionally synthesize or isolate explosive compounds in the lab. Some synthetic pathways may proceed via a potentially explosive intermediate. Explosive compounds can form as a result of certain decomposition reactions such as when commercial chemicals or chemical samples are stored improperly, kept past their expiration date, or heated. Mixing incompatible chemicals, especially in a tightly sealed container, can also result in explosions.

Functional groups: All compounds with bonds between electronegative atoms should be considered to be highly reactive, but the following functional groups should alert you to danger:

- Peroxides (-O-O-, -O-O-O-)
- Nitro compounds (O-NO₂, N-NO₂, and C-NO₂)
- Nitroso compounds (O-NO, N-NO)
- Azo and related compounds (C=N₂, R-N₂⁺, -N=N-, -N₃, -N=N-S-N=N-)
- Hypohalites and haloamines (RCOO-X, N-X)
- Oxyhalide salts (ClO₄⁻, ClO₃⁻, BrO₃⁻, IO₃⁻, ClO₂, ClO⁻)
- And related metal salts (M-N₃, M-CC-M, M-N=C=O, M-OCIO₃, picrates, dinitrophenolates)

Safety related to explosive chemistry:

Our muwahhid brother, dilution decreases the potential for explosive chain reactions. Avoid the use of metal spatulas and needles when working with compounds for which metal ions may catalyze explosive decomposition reactions. Avoid the use of test tubes when working with compounds for which friction or mechanical shock may trigger explosion.

Explosive reactions are often triggered by one of the following conditions or events:

- Heat
- Impact
- Friction
- Catalysts
- Light



Avoid any of these conditions that may trigger the class of compound you are working with.



Compatibility and storage of chemicals. Each of the chemicals mentioned previously should be stored away from each other. Chemical families are broken down into compatibility groups.

We repeat once again: Violent and dangerous reactions can occur if chemicals of different kinds are stored with each other. Therefore, each chemical used should be checked to see which category it fits into and should only be stored with like materials. This is a precaution for your safety, our muwahhid brother.

Course completed

All praise due to Allah

May Allah grant you success, aid you, guide your aim,
and protect you from every harm.

Do not forget us from your sincere dua

Your brothers

Al-Saqri Foundation for Military Sciences